READING MATERIAL

AUTOMOBILES AND AIR POLLUTION

Each of today's cars produces 60 to 80 percent less pollution than cars in the 1960s. More people are using mass transit. Per the Clean Air Act, leaded gasoline will be phased out completely as of January 1995, resulting in dramatic declines in air levels of lead, a very toxic chemical. Despite this progress, many types of air pollution that arise in part from mobile sources have not improved significantly. At present in the United States:

- Motor vehicles are responsible for at least half of the smog-forming volatile organic carbon (VOC) and nitrogen oxide pollutants in the air.
- Nearly 100 cities exceed the EPA National Ambient Air Quality Standard for ozone.
- Motor vehicles release more than 50 percent of the hazardous, cancer-causing air pollutants in the air.
- Motor vehicles release about 90 percent of the carbon monoxide found in urban air.

What Went Wrong?

Although there has been significant progress since 1970 in reducing emissions per mile traveled, the number of cars on the road and the miles they travel almost doubled in the same time frame. As lead was being phased out, gasoline refiners changed gasoline formulas to make up for octane loss, and the changes made gasoline more likely to release smog-forming vapors into the air.

Another reason that pollution levels remain high is that emission control systems do not always perform as designed over the full useful life of the vehicle. Routine aging and deterioration, poor state of tune, and emission control tampering can increase vehicle emissions. In fact, a major portion of auto-related hydrocarbons can be attributed to a relatively small number of "super-dirty" cars whose emission control systems are not working properly.

What Are the Most Dangerous Pollutants from Vehicles?

Air toxics are pollutants that cause adverse health effects. The EPA has focused a large part of its air toxics efforts to date on carcinogens, compounds that cause cancer. Motor vehicles emit several pollutants that EPA classifies as probable or definite carcinogens, including benzene, formaldehyde, acetaldehyde, 1-3-butadiene, and particulates (soot and smoke, especially from diesel vehicles).

Ozone is a form of molecular oxygen that consists of three oxygen atoms linked together. Ozone in the upper atmosphere (the "ozone layer") occurs naturally and protects life on earth by filtering out ultraviolet radiation from the sun. But ozone at ground level is the major component of smog and presents this country's most intractable urban air quality problem.

What Are the Effects on Public Health?

Vehicles are such an integral part of our society that virtually everyone is exposed to their emissions. EPA estimates that mobile source (car, truck, and bus) air toxics may cause up to 1,500 cases of cancer each year, about half of the cancers caused by all outdoor sources of air toxics.

Ozone is responsible for the choking, coughing, and stinging eyes associated with smog. Ozone damages lung tissue, aggravates respiratory disease, and makes people more susceptible to respiratory infections. Adults with existing diseases and children are especially vulnerable to ozone's harmful effects. Elevated ozone levels also inhibit plant growth and can cause widespread damage to crops and forests.

How Are Pollutants from Vehicles Formed?

Some air toxics are components of gasoline, such as benzene, which is added to gasoline to increase octane. Cars emit benzene as unburned fuel or as fuel vapors that evaporate during refueling. Formaldehyde, particulates, and 1,3-butadiene are not present in fuel but are by-products of incomplete combustion.

Ozone is not in fuels and is not a by-product of combustion, but is formed in the atmosphere through a complex set of chemical reactions involving hydrocarbons, oxides of nitrogen, and sunlight. In typical urban areas, at least half of those pollutants come from cars, buses, trucks, and boats. The rate at which the reactions proceed is related to both temperature and intensity of the sunlight. Because of this, high ozone levels occur most frequently on hot summer afternoons.

What Has Been Done To Control Vehicle Emissions?

The Clean Air Act of 1970 gave EPA the primary responsibility for regulating "mobile sources," which include cars, trucks, and buses. The EPA vehicle emission control program has achieved considerable success in reducing both nitrogen oxide and hydrocarbon emissions. Cars coming off today's production lines typically emit 70 percent less nitrogen oxides and 80 to 90 percent less hydrocarbons over their lifetimes than their uncontrolled counterparts of the 1960s.

Pre-1975 vehicles without catalytic converters, and even pre-1981 vehicles with simple catalysts, emit far more pollutants than newer vehicles. Air toxics from motor vehicles will decrease during the 1990s as older cars wear out. However, without additional control, and with more cars driving more miles, overall emissions of air toxics will begin to increase again by the beginning of the next century.

What Else Can Be Done?

Control of hydrocarbon and nitrogen oxide emissions is the most promising strategy for reducing pollution levels in most urban areas. EPA has established more stringent limits on gasoline volatility, tightened tailpipe emission standards, required improvements in inspection and maintenance programs, and required long-lasting catalytic converters.

In the most polluted cities, however, these measures will not be sufficient. Further exhaust emission controls for vehicles are approaching the limit of technology. The only way to ensure healthy air is to markedly reduce our use of cars or to switch to cleaner fuels.

Some fuels are inherently cleaner than gasoline because they emit less nitrogen oxides or hydrocarbons that are less likely to react in the atmosphere to form ozone. These fuels include alcohols, electricity, natural gas, and liquid petroleum (propane). Changes in the composition of gasoline itself (such as reducing fuel volatility or reducing benzene content) also can reduce emissions of most air toxics.

Unless we dramatically reduce the amount of pollution vehicles emit in actual use or drastically cut back on the amount we drive, smog-free air will continue to elude many cities.

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